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1. Introduction

1.1 Using This Manual

This initial section of the manual will cover the back panel connections and wiring instructions. A quick overview of how to navigate the PLATINUM$_{TM}$ Series menu structure follows in Section 2. This is followed in Section 3 by the complete PLATINUM$_{TM}$ Series menu tree. Remember, not all commands and parameters in that menu tree will show up on your unit, as those that are not available with your configuration are automatically hidden. Repetitive menu structures are highlighted in gray and only shown once but are used multiple times; examples include scaling process inputs for the different process input ranges, setting up the data communications protocol for each of the communications channels, configuration for multiple outputs, etc.

This manual is optimized for online use. Therefore, the blue entries in the Section 2 menu tree are hyperlinks that take you straight to the corresponding reference section entry when you click on them. The Reference Section—encompassing Initialization Mode in Section 4, Programming Mode in Section 5, and Operating Mode in Section 6—will provide more detail on what parameter and command choices you have, how they operate, and why you might want to choose a specific value. There are also blue cross-references embedded in the Reference Section (the blue section headers however, are not hyperlinks). In addition, the Table of Contents on pages 3 through 6 is hyperlinked to all of the entries throughout the manual that are listed in it.

1.2 Safety Considerations

This device is marked with the international caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

This instrument is a panel mount device protected in accordance with EN 61010-1:2010, electrical safety requirements for electrical equipment for measurement, control, and laboratory use. Installation of this instrument should be done by qualified personnel.

⚠ **In order to ensure safe operation, the following instructions must be followed and warnings observed:**

This instrument has no power-on switch. An external switch or circuit-breaker must be included in the building installation as a disconnecting device. It must be marked to indicate this function, and it must be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker must comply with the relevant requirements of IEC 947–1 and IEC 947-3 (International Electrotechnical Commission). The switch must not be incorporated in the main supply cord.

Furthermore, to provide protection against excessive energy being drawn from the main supply in case of a fault in the equipment, an overcurrent protection device must be installed.

- Do not exceed the voltage rating on the label located on the top of the instrument housing.
- Always disconnect the power before changing the signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure that the instrument does not exceed the operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install this instrument without exposing the bare wire outside the connector to minimize electrical shock hazards.

⚠ **EMC Considerations**

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Beads on signal wires close to the instrument if EMC problems persist.

⚠ **Failure to follow all instructions and warnings is at your own risk and may result in property damage, bodily injury and/or death. Omega Engineering is not responsible for any damages or loss arising or resulting from any failure to follow any and all instructions or observe any and all warnings.**

1.3 Wiring Instructions

1.3.1 Back Panel Connections

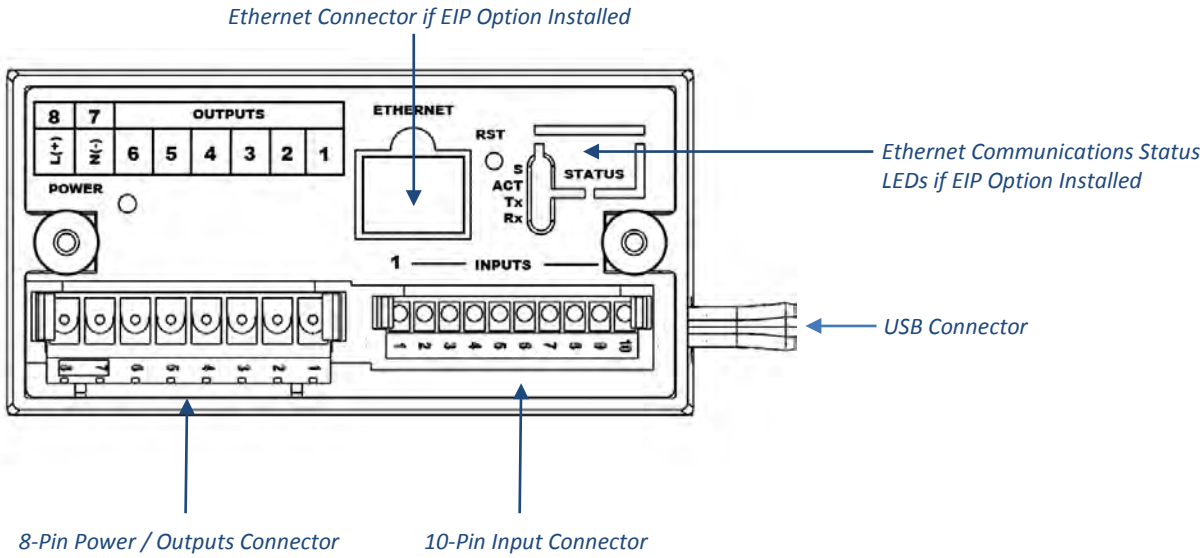


Figure 1.1 – DP8Pt Models: Back Panel Connections

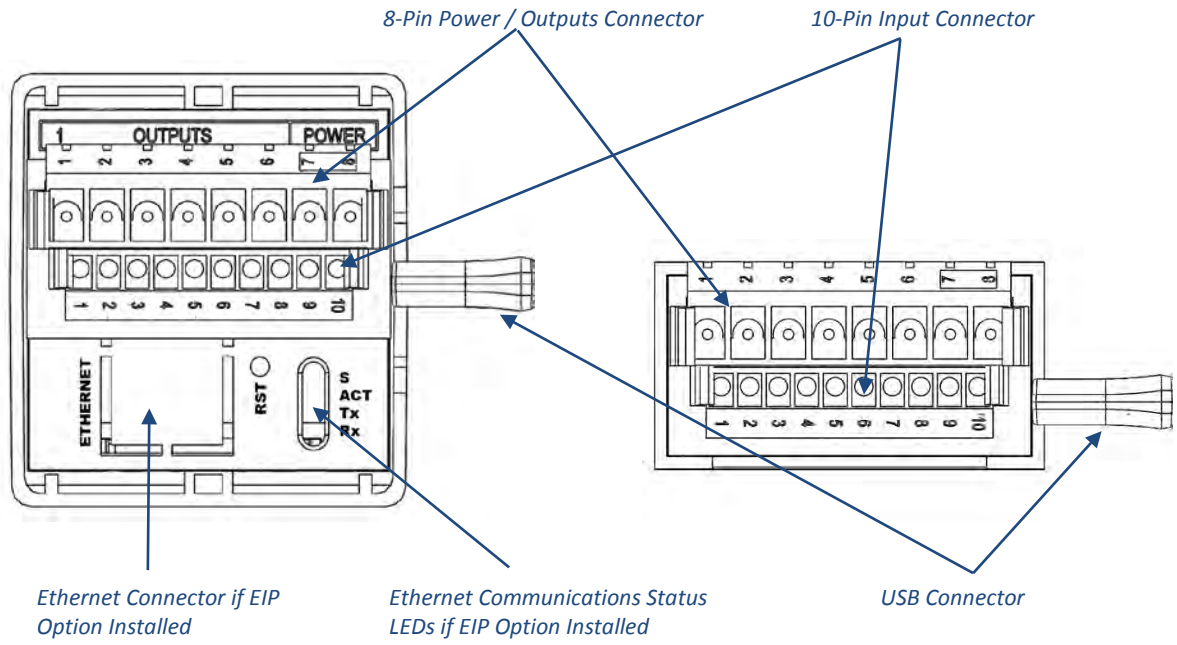
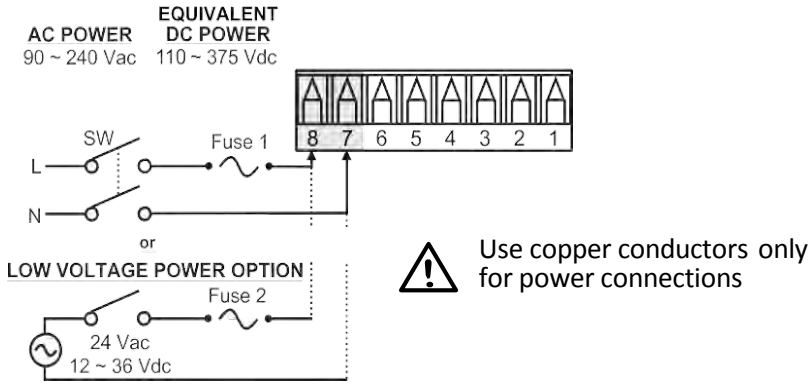


Figure 1.2 – DP16Pt and DP32Pt Models: Back Panel Connections

1.3.2 Connecting Power

Connect the main power connections to pins 7 and 8 of the 8-pin power / output connector as shown in Figure 1.3.



Caution: Do not connect power to your device until you have completed all input and output connections. Failure to do so may result in injury!

Figure 1.3 – Main Power Connections

For the low-voltage power option, maintain the same degree of protection as the standard high-voltage input power units (90–240 Vac) by using a Safety Agency Approved DC or AC source with the same Overvoltage Category and pollution degree as the standard AC unit (90–240 Vac).

The Safety European Standard EN61010-1 for measurement, control, and laboratory equipment requires that fuses must be specified based on IEC127. This standard specifies the letter code "T" for a Time-lag fuse.

1.3.3 Connecting Inputs

The 10-pin input connector assignments are summarized in Table 1.1. Table 1.2 summarizes the universal input pin assignments for different sensor inputs. All sensor selections are firmware-controlled (see 4.1 Input Configuration (INIt > INPt)) and no jumper settings are required when switching from one type of sensor to another. Figure 1.4 provides more detail for connecting RTD sensors. Figure 1.5 shows the connection scheme for process current input with either internal or external excitation.

Pin No.	Code	Description
1	ARTN	Analog return signal (analog ground) for sensors
2	AIN+	Analog positive input
3	AIN-	Analog negative input
4	APWR	Analog power currently only used for 4-wire RTDs
5	AUX	Only used with controller models
6	EXCT	Excitation voltage output referenced to ISO GND
7	DIN	Digital input signal (latch reset), Positive at > 2.5V, ref. to ISO GND
8	ISO GND	Isolated ground for serial communications, excitation, and digital input
9	RX/A	Serial communications receive
10	TX/B	Serial communications transmit

Table 1.1 – 10-Pin Input Connector Wiring Summary

Pin Number	Process Voltage	Process Current	Thermo-couple	2-Wire RTD	3-Wire RTD	4-Wire RTD	Ther-mistor
1	Rtn			**	RTD2-	RTD2+	
2	Vin +/-	I+	T/C+	RTD1+	RTD1+	RTD1+	TH+
3		I-	T/C-			RTD2-	TH-
4				RTD1-	RTD1-	RTD1-	

** Requires external connection to pin 4

Table 1.2 – Interfacing Sensors to the Input Connector

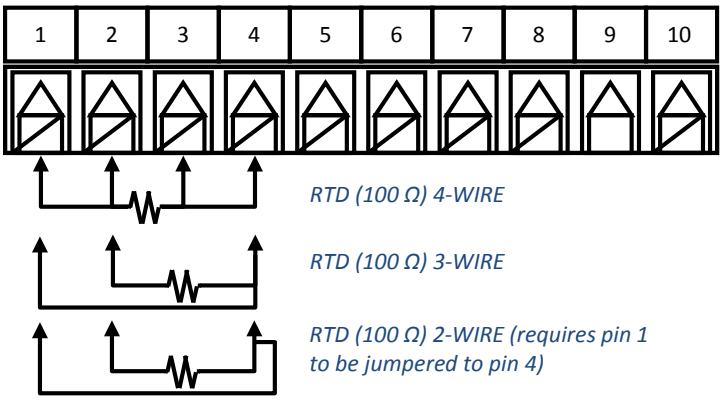


Figure 1.4 – RTD Wiring Diagram

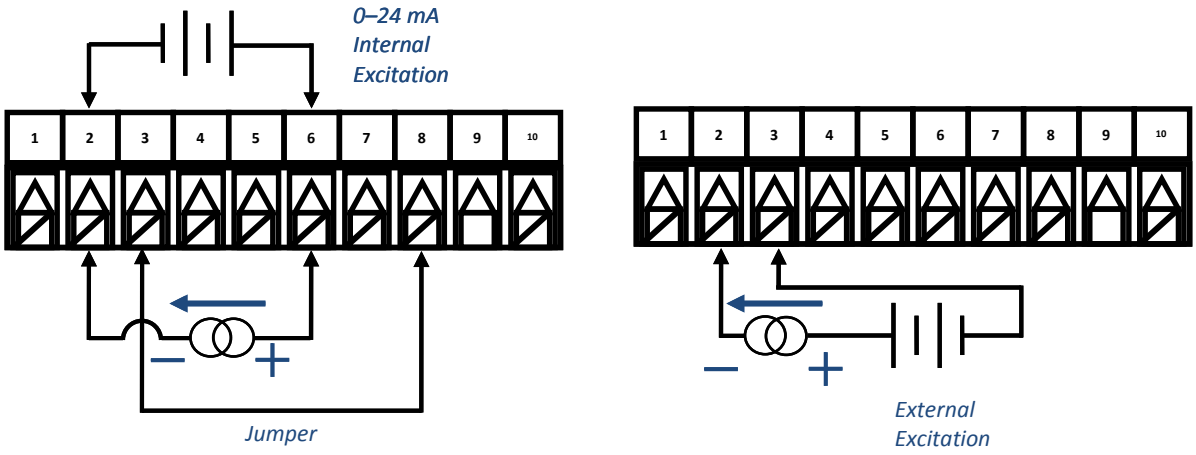


Figure 1.5 – Process Current Wiring Hookup with Internal and External Excitation

1.3.4 Connecting Outputs on Units with Alarm Relays

The PLATINUM$_{TM}$ Series Meters can be configured with two alarm only Single Pole Double Throw Mechanical Relays. This is the "-330" option and these SPDT relays have snubbers built in, but only on the normally open contact side.

		Power		Output Pin Number					
Config.	**Description**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
	Base Meter – No Outputs	AC+ or DC+	AC- or DC-						
-330	SPDT, SPDT			N.O	Com	N.C	N.O	Com	N.C

Table 1.3 – 8 Pin Output/Power Connector Wiring Summary by Configuration

Code	Definition	Code	Definition
N.O.	Normally open relay/SSR load	**AC-**	AC power neutral in pin
Com	Relay Common/SSR AC power	**AC+**	AC power hot in pin
N.C.	Normally closed relay load	**DC-**	Negative DC power in pin
		DC+	Positive DC power in pin

Table 1.4 – Definitions for Abbreviations in Table 1.3

2. Navigation

2.1 Description of Button Actions

The UP button moves up a level in the menu structure. Pressing and holding the UP button navigates to the top level of any menu (**oPER**, **PRoG**, or **INIt**). This can be a useful way of reorienting yourself if you get lost in the menu structure.

The LEFT button moves across a set of menu choices at a given level (up in the Section 4 menu structure tables). When changing numerical settings, press the LEFT button to make the next digit (one digit to the left) active.

The RIGHT button across a set of menu choices at a given level (down in the Section 4 menu structure tables. The RIGHT button also scrolls numerical values up with overflow to 0 for the flashing digit selected.

The ENTER button selects a menu item and goes down a level, or it enters a numerical value or parameter choice.

2.2 Menu Structure

The menu structure of the PLATINUM$_{TM}$ Series is divided into 3 main Level 1 groups, which are Initialization, Programming, and Operating. They are described in Section 2.3. The complete menu structure for levels 2-8 for each of the three Level 1 groups is detailed in Section 3.1, 3.2, and 3.3. Levels 2 through 8 represent sequentially deeper levels of navigation. Values with a dark box around them are default values or submenu entry points. Blank lines indicate user-provided information. Some menu

items include links to reference information elsewhere in this user manual. The information in the Notes column defines each menu choice.

2.3 Level 1 Menu

INIt Initialization Mode: These settings are rarely changed after initial setup. They include transducer types, calibration, etc. These settings can be password-protected.

PRoG Programming Mode: These settings are frequently changed. They include Setpoints, Control Modes, Alarms, etc. These settings can be password-protected.

oPER Operating Mode: This mode allows users to switch between Run Mode, Standby Mode, Manual Mode, etc.

2.4 Circular Flow of Menus

The following diagram shows how to use the LEFT and RIGHT buttons to navigate around a menu.

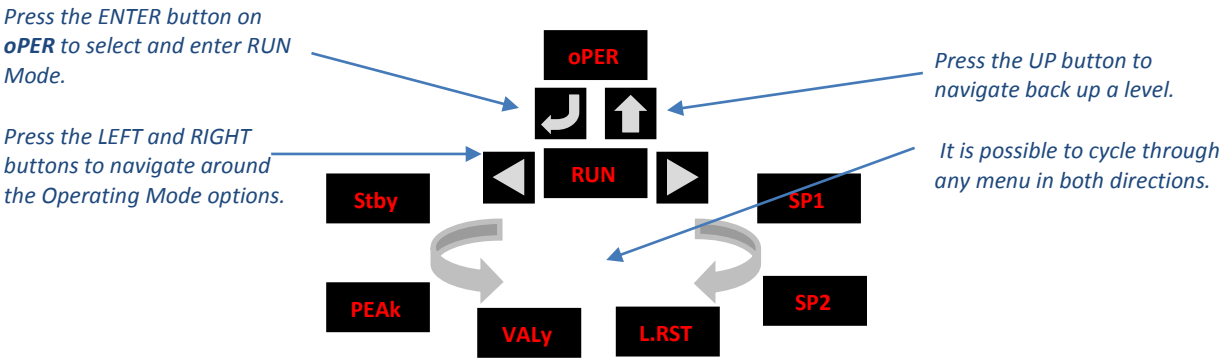

Press the ENTER button on oPER to select and enter RUN Mode.
Press the LEFT and RIGHT buttons to navigate around the Operating Mode options.
oPER
RUN
Stby
SP1
PEAk
VALy
L.RST
SP2
Press the UP button to navigate back up a level.
It is possible to cycle through any menu in both directions.

Figure 2.1 – Circular Flow of Menus

3. Complete Menu Structure

3.1 Initialization Mode Menu (INIt)

The following table maps the Initialization Mode (**INIt**) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
INPt	t.C.	k					Type K thermocouple
		J					Type J thermocouple
		t					Type T thermocouple
		E					Type E thermocouple
		N					Type N thermocouple
		R					Type R thermocouple
		S					Type S thermocouple
		b					Type B thermocouple
		C					Type C thermocouple
	Rtd	N.wIR	3 wI				3-wire RTD
			4 wI				4-wire RTD
			2 wI				2-wire RTD
		A.CRV	385.1				385 calibration curve, 100 Ω
			385.5				385 calibration curve, 500 Ω
			385.t				385 calibration curve, 1000 Ω
			392				392 calibration curve, 100 Ω
			3916				391.6 calibration curve, 100 Ω
	tHRM	2.25k					2250 Ω thermistor
		5k					5000 Ω thermistor
		10k					10,000 Ω thermistor
	PRoC	4–20					Process input range: 4 to 20 mA
			Note: This Manual and Live Scaling submenu is the same for all **PRoC** ranges.				
			MANL	Rd.1	____		Low display reading
				IN.1	____		Manual input for Rd.1
				Rd.2	____		High display reading
				IN.2	____		Manual input for Rd.2
			LIVE	Rd.1	____		Low display reading
				IN.1	____		Live Rd.1 input, ENTER for current
				Rd.2	____		High display reading
				IN.2	____		Live Rd.2 input, ENTER for current
		0–24					Process input range: 0 to 24 mA
		+-10					Process input range: -10 to +10 mA
		+-1					Process input range: -1 to +1 mA
		+-0.1					Process input range: -0.1 to +0.1 mA

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
RdG	dEC.P	FFF.F					Reading format -999.9 to +999.9
		FFFF					Reading format -9999 to +9999
		FF.FF					Reading format -99.99 to +99.99
		F.FFF					Reading format -9.999 to +9.999
	°F°C	°F					Activates degrees Fahrenheit
		°C					Degrees Celsius annunciator
		NoNE					Default for **INPt** = **PRoC**
	FLtR	8					Readings per displayed value: 8
		16					16
		32					32
		64					64
		128					128
		1					2
		2					3
		4					4
	NCLR	GRN					Default display color: Green
		REd					Red
		AMbR					Amber
	bRGt	HIGH					High display brightness
		MEd					Medium display brightness
		Low					Low display brightness
ECtN	5 V						Excitation voltage: 5 V
	10 V						10 V
	12 V						12 V
	24 V						24 V
	0 V						Excitation off
CoMM	USb						Configure the USB port
		Note: This **PRot** submenu is the same for USB, Ethernet, and Serial ports.					
		PRot	oMEG	ModE	CMd		Waits for commands from other end
					CoNt	____	Transmit continuously every ###.# sec
				dAt.F	StAt	No	
						yES	Includes Alarm status bytes
					RdNG	yES	Includes process reading
						No	
					PEAk	No	
						yES	Includes highest process reading
					VALy	No	
						yES	Includes lowest process reading

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
					UNIt	No	
						yES	Send unit with value (F, C, V, mV, mA)
				_LF_	No		
					yES		Appends line feed after each send
				ECHo	yES		Retransmits received commands
					No		
				SEPR	_CR_		Carriage Return separator in **CoNt**
					SPCE		Space separator in **CoNt** Mode
			M.bUS	RtU			Standard Modbus protocol
				ASCI			Omega ASCII protocol
		AddR	____				USB requires Address
	EtHN	PRot					Ethernet port configuration
		AddR	____				Ethernet "Telnet" requires Address
	SER	PRot					Serial port configuration
		C.PAR	bUS.F	232C			Single device Serial Comm Mode
				485			Multiple devices Serial Comm Mode
			bAUd	19.2			Baud rate: 19,200 Bd
				9600			9,600 Bd
				4800			4,800 Bd
				2400			2,400 Bd
				1200			1,200 Bd
				57.6			57,600 Bd
				115.2			115,200 Bd
			PRty	odd			Odd parity check used
				EVEN			Even parity check used
				NoNE			No parity bit is used
				oFF			Parity bit is fixed as a zero
			dAtA	8bIt			8 bit data format
				7bIt			7 bit data format
			StoP	1bIt			1 stop bit
				2bIt			2 stop bits gives a "force 1" parity bit
		AddR	____				Address for 485, placeholder for 232
SFty	PwoN	dSbL					Turn on: in **oPER** Mode, ENTER to run
		ENbL					Turn on: program runs automatically
	RUN.M	dSbL					ENTER in **Stby, PAUS, StoP** runs
		ENbL					ENTER in modes above displays RUN
	SP.LM	SP.Lo	____				Low Setpoint limit
		SP.HI	____				High Setpoint limit

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
	LPbk	dSbL					Loop break timeout disabled
		ENbL	____				Loop break timeout value (MM.SS)
	o.CRk	ENbl					Open Input circuit detection enabled
		dSbL					Open Input circuit detection disabled
t.CAL	NoNE						Manual temperature calibration
	1.PNt						Set offset, default = 0
	2.PNt	R.Lo					Set range low point, default = 0
		R.HI					Set range high point, default = 999.9
	ICE.P	ok?					Reset 32°F/0°C reference value
SAVE	____						Download current settings to USB
LoAd	____						Upload settings from USB stick
VER.N	1.00.0						Displays firmware revision number
VER.U	ok?						ENTER downloads firmware update
F.dFt	ok?						ENTER resets to factory defaults
I.Pwd	No						No required password for **INIt** Mode
	yES	____					Set password for **INIt** Mode
P.Pwd	No						No password for **PRoG** Mode
	yES	____					Set password for **PRoG** Mode

3.2 Programming Mode Menu (PRoG)

The following table maps the Programming Mode (**PRoG**) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
SP1	____				Process goal for PID, default goal for **oN.oF**
SP2	ASbo				Setpoint 2 value can track **SP1**, **SP2** is an absolute value
	dEVI				**SP2** is a deviation value
ALM.1	***Note:*** This submenu is the same for all other Alarm configurations.				
	tyPE	oFF			ALM.1 is not used for display or outputs
		AboV			Alarm: process value above Alarm trigger
		bELo			Alarm: process value below Alarm trigger
		HI.Lo.			Alarm: process value outside Alarm triggers
		bANd			Alarm: process value between Alarm triggers
	Ab.dV	AbSo			Absolute Mode; use **ALR.H** and **ALR.L** as triggers
		d.SP1			Deviation Mode; triggers are deviations from **SP1**
		d.SP2			Deviation Mode; triggers are deviations from **SP2**
	ALR.H	____			Alarm high parameter for trigger calculations

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
	ALR.L	____			Alarm low parameter for trigger calculations
	A.CLR	REd			Red display when Alarm is active
		AMbR			Amber display when Alarm is active
		GRN			Green display when Alarm is active
		dEFt			Color does not change for Alarm
	HI.HI	oFF			High High / Low Low Alarm Mode turned off
		oN	____		Offset value for active High High / Low Low Mode
	LtCH	No			Alarm does not latch
		yES			Alarm latches until cleared via front panel
		botH			Alarm latches, cleared via front panel or digital input
		RMt			Alarm latches until cleared via digital input
	CtCL	N.o.			Output activated with Alarm
		N.C.			Output deactivated with Alarm
	A.P.oN	yES			Alarm active at power on
		No			Alarm inactive at power on
	dE.oN	____			Delay turning off Alarm (sec), default = 1.0
	dE.oF	____			Delay turning off Alarm (sec), default = 0.0
ALM.2					Alarm 2
DTR1					Double Throw Relay 1 with "–330" units
	ModE	oFF			Output does nothing
		ALM.1			Output is active under **ALM.1** conditions
		ALM.2			Output is active under **ALM.2** conditions
DTR2					Double Throw Relay 2 with "–330" units
	ModE	oFF			Output does nothing
		ALM.1			Output is active under **ALM.1** conditions
		ALM.2			Output is active under **ALM.2** conditions
		RE.oN			Activate during Ramp events

3.3 Operating Mode Menu (oPER)

The following table maps the Operating Mode (**oPER**) navigation:

Level 2	Level 3	Level 4	Notes
RUN			Normal Run Mode, process value displayed, **SP1** in optional secondary display
SP1	____		Shortcut to change Setpoint 1, current Setpoint 1 value in main display
SP2	____		Shortcut to change Setpoint 2, current Setpoint 2 value in main display
MANL	M.CNt	____	Manual Mode, the RIGHT and LEFT buttons control output, displays **M###.#**
	M.INP	____	Manual Mode, the RIGHT and LEFT buttons simulate the input for testing
PAUS			Pause and hold at current process value, display flashes
StoP			Stop controlling, turn off outputs, process value rotating flash, Alarms remain
L.RSt			Clears any latched Alarms; Alarms menu also allows digital input reset
VALy			Displays the lowest input reading since the **VALy** was last cleared
PEAk			Displays the highest input reading since the **PEAk** was last cleared
Stby			Standby Mode, outputs, and Alarm conditions disabled, displays **Stby**

4. Reference Section: Initialization Mode (INIt)

Use Initialization Mode to set the following parameters and perform the following functions:

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4.1 Input Configuration (INIt > INPt)

↵	Select the Input parameter (**INPt**) to configure the input.
◀ ▶	Navigate to the correct setting. Settings include the following: • **t.C.** – Thermocouple Temperature Sensor (entry point) • **Rtd** – Resistance Temperature Detector (RTD) • **tHRM** – Thermistor Temperature Sensor • **PRoC** – Process Voltage or Current Input
↵	Select the indicated setting.

4.1.1 Thermocouple Input Type (INIt > INPt > t.C.)

↵	Select Thermocouple (**t.C.**) as the input type (factory default). Then specify a specific type of thermocouple or the last selected type will be used.

◀▶	Navigate to the installed thermocouple type. Supported types are as follows: • **k** – Type K (factory default) • **J** – Type J • **t** – Type T • **E** – Type E • **N** – Type N • **R** – Type R • **S** – Type S • **b** – Type B • **C** – Type C
↵	Select the indicated type.

4.1.2 Resistance Temperature Detector (RTD) Input Type (INIt > INPt > Rtd)

↵	Select **Rtd** as the input type. Factory default configuration settings are three-wire, 100 Ω, using the European standard 385 curve. Note that the 392 and 3916 curves are only available for 100 Ω RTDs. If **Rtd** is selected and a specific configuration is not changed, the last saved configuration will be used.
◀▶	Navigate to the desired configuration parameter: • **N.wIR** – Firmware selection of the number of wires for RTD connection (no jumpers needed) • **A.CRV** – Calibration curve covering both the international standard and the resistance of the RTD
↵	Select the option.

4.1.2.1 Number of RTD Wires (INIt > INPt > Rtd > N.wIR)

◀▶	Navigate to the desired setting. Settings include the following: • **3 wI** – Three-wire RTD (factory default) • **4 wI** – Four-wire RTD • **2 wI** – Two-wire RTD
↵	Select the indicated option.

4.1.2.2 Calibration Curve (INIt > INPt > Rtd > A.CRV)

◀▶	Navigate to the desired setting. Settings include the following: • **385.1** – European and most common standard at the conventional resistance of 100 Ω (factory default) • **385.5** – European curve for 500 Ω • **385.t** – European curve for 1000 Ω • **392** – Old US standard (rarely used), at 100 Ω only • **3916** – Japanese standard, at 100 Ω only

↵	Select the indicated option.

4.1.3 Thermistor Input Type Configuration (INIt > INPt > tHRM)

↵	Select Thermistor (**tHRM**) as the input type. This sets up the unit for thermistor-based temperature measurement and then the specific thermistor type can be specified. If no thermistor type is specified, the last selected type is used.
◀ ▶	Navigate to the correct setting. Settings include the following: • **2.25k** – 2,250 Ω thermistor (factory default) • **5k** – 5,000 Ω thermistor • **10k** – 10,000 Ω thermistor
↵	Select the indicated option.

4.1.4 Process Input Type Configuration (INIt > INPt > PRoC)

↵	Select Process (**PRoC**) as the input type. Then select the process input range and scale it. If you stop after selecting the **PRoC** input type, the last selected input range and scaling is used.
◀ ▶	Navigate to the voltage or current range of the process input. Any signal input outside of the specified hardware input range will result in an "out-of-range" error (code E009). Input range choices include the following: • **4–20** – 4 mA to 20 mA (factory default) • **0–24** – 0 mA to 24 mA • **+–10** – -10 V to +10 V • **+–1** – -1 V to +1 V • **+–0.1** – -1 mV to +1 mV
↵	Select the desired range.
◀ ▶	Choose either manual or live scaling. The scaling functions translate process values to engineering units and are available for all process input ranges. The defaults for each input range are the hardware minimum and maximum. Scaling methods include the following: • **MANL** – User manually enters all four scaling parameters • **LIVE** – User manually enters the low and high display values (**RD.1** and **RD.2**) but reads the input signal directly to set the low and high input values (**IN.1** and **IN.2**) Scaled values are calculated as: Scaled Value = Input * Gain + Offset, where: Gain = (Rd.2 – Rd.1) / (IN.2 – IN.1) Offset = Rd.1 – (Gain * IN.1) Therefore scaling can be done over a subset of the applicable range as this scaling calculation linearly extrapolates in both directions.
↵	Select the scaling method to be used.

◀▶	Navigate to the desired scaling parameter. Options include the following: • **Rd.1** – Reading low value corresponding to **IN.1** signal • **IN.1** – Input signal corresponding to **RD.1** • **Rd.2** – Reading high value corresponding to **IN.2** signal • **IN.2** – Input signal corresponding to **RD.2** In Manual Mode, **IN.1** and **IN.2** are entered manually for scaling;, in Live Mode, **IN.1** and **IN.2** activate a read of the input signal for scaling.
↵	Select the scaling parameter to change.
◀▶	For manual inputs, set the selected scaling parameter to the desired value.
↵	Confirm the value for the selected scaling parameter in Manual Mode (**MANL**), or read and accept the input signal for either **IN.1** or **IN.2** in Live Mode (**LIVE**).

4.2 Display Reading Formats (INIt > RdG)

↵	Select Reading Formats (**RdG**) to configure the front panel display.
◀▶	Navigate to the desired setting. Settings include the following: • **dEC.P** – Decimal-point format (entry point) • **°F°C** – Temperature units • **FLtR** – Filter (readings displayed per second) • **ANN.1** – Annunciator 1 setting • **ANN.2** – Annunciator 2 setting • **NCLR** – Normal color (default display color) • **bRGt** – Display brightness
↵	Select the indicated setting.

4.2.1 Decimal Point Format (INIt > RdG > dEC.P)

↵	Select Decimal Point (**dEC.P**) and then select the desired decimal-point format. Only the FFF.F and FFFF formats work for temperature inputs but all four can be used with process inputs. While this parameter sets the default format, the numeric display will autorange (automatically shift the decimal point) if necessary.
◀▶	Navigate to the desired setting. Settings include the following: • **FFF.F** – One decimal place (factory default) • **FFFF** – Zero decimal places • **FF.FF** – Two decimal places (not a choice with temperature inputs) • **F.FFF** – Three decimal places (not a choice with temperature inputs)
↵	Select the indicated format.

4.2.2 Temperature Units (INIt > RdG > °F°C)

↵	Select the Temperature Units (**°F°C**) parameter, and the current temperature unit selection is then displayed.

◀▶	Navigate to the desired setting. Settings include the following: • **°F** – Degrees Fahrenheit (factory default), °F annunciator turned on • **°C** – Degrees Celsius, °C annunciator turned on • **NoNE** – Default for **INPt** = **PRoC,** both temp unit annunciators turned off; if the process level input signal corresponds to a temperature (temperature transmitters for example), the appropriate temperature type annunciator can be chosen
↵	Select the indicated option.

4.2.3 Filter (INIt > RdG > FLtR)

↵	Select the Filter (**FLtR**) parameter. Filtering averages multiple input analog to digital conversions, which can suppress noise in the input signal. This should be set to an appropriate value depending on the response time of the input.
◀▶	Navigate to the desired setting corresponding to the number of readings per displayed value. Settings include the following (calculated times between display value updates are shown for each setting as well): • **8** – 0.4 s (factory default) • **16** – 0.8 s • **32** – 1.6 s • **64** – 3.2 s • **128** – 6.4 s • **1** – 0.05 s • **2** – 0.1 s • **4** – 0.2 s
↵	Select the indicated option.

4.2.4 Normal Color (INIt > RdG > NCLR)

↵	Select the Normal Color (**NCLR**) parameter. This controls the default display color, which can then be overridden by Alarms.
◀▶	Navigate to the desired setting. Settings include the following: • **GRN** – Green (factory default) • **REd** – Red • **AMbR** – Amber
↵	Select the indicated option.

4.2.5 Brightness (INIt > RdG > bRGt)

↵	Select the Brightness (**bRGt**) parameter.
◀▶	Navigate to the desired setting. Settings include the following: • **HIGH** – High display brightness (factory default) • **MEd** – Medium display brightness • **Low** – Low display brightness
↵	Select the indicated option.

4.3 Excitation Voltage (INIt > ECtN)

↵	Select the Excitation Voltage (**ECtN**) parameter.
◀ ▶	Navigate to the correct setting. Settings include the following: • **5 V** – 5 Volt excitation voltage (factory default) • **10 V** – 10 Volt excitation voltage • **12 V** – 12 Volt excitation voltage • **24 V** – 24 Volt excitation voltage • **0 V** – Excitation turned off
↵	Select the indicated option.

4.4 Communication (INIt > CoMM)

↵	Select the Communication Type (**CoMM**) to configure. Only installed communications options show up for configuration (USB is always present). If more than one communications option is installed, any or all of them can be configured for simultaneous operation.
◀ ▶	Navigate to the correct option. Options include the following: • **USb** – Universal Serial Bus (USB) communications (factory default) • **EtHN** – Ethernet communications configuration • **SER** – Serial (either RS232 or RS485) communications configuration
↵	Select the indicated option.
◀ ▶	Navigate to the desired parameter submenu. Options include the following: • **PRot** – Protocol • **AddR** – Address *Note:* The serial communications (**SER**) option above also includes the following parameter: • **C.PAR** – Communications parameters only applicable to serial communications
↵	Select the indicated option.

4.4.1 Protocol (INIt > CoMM > USb, EtHN, SER > PRot)

↵	Select the Protocol (**PRot**) parameter.
◀ ▶	Navigate to the desired setting. Settings include the following: • **oMEG** – (factory default) Omega's Protocol, using standard ASCII encoding. Further detail on this format is covered in the Communications Manual. • **M.bUS** – Modbus protocol, available as Modbus RTU (**RtU**, default) or Modbus/ASCII (**ASCI**). The Ethernet option supports Modbus/TCPIP. More detail on using this protocol can be found in the Communications Manual.
↵	Select the desired setting.

4.4.1.1 ASCII Parameters (INIt > CoMM > USb, EtHN, SER > PRot > oMEG)

↵	Select **oMEG** to configure Omega ASCII mode communications parameters. These configuration settings are the same for USB, Ethernet, and Serial communications.
◀ ▶	Navigate to the desired parameter. Parameters and sub-parameters include the following: • **ModE** – Choose the Mode for initiating ASCII data transfer: o **CMd** – Data is sent after receiving a prompt command from the connected device (factory default). o **CoNt** – Data is sent as it is collected; you can set the seconds between data sends (###.#), default = 001.0. In Continuous Mode, sending a CTRL/Q to the unit suspends transmission and sending a CTRL/S restarts transmission. • **dAt.F** – Data Format; select **yES** or **No** for the following settings: o **StAt** – Alarm status bytes are sent with the data o **RdNG** – Sends the process reading o **PEAk** – Sends the highest process reading so far o **VALy** – Sends the lowest process reading so far o **UNIt** – Sends the unit with the value (F, C, V, mV, mA) • **_LF_** – Select **yES** or **No**; **yES** sends a line feed between each data block to format the output in a more readable fashion. • **ECHo** – Select **yES** or **No**; **yES** echoes each received command to allow verification. • **SEPR** – Determines the separation character between each data block: o **_CR_** – A carriage return sent between data blocks (factory default). o **SPCE** – A space character is sent between each data block.
↵	Select the indicated option, and manage submenus and parameters as required.

4.4.2 Address (INIt > CoMM > USb, EtHN, SER > AddR)

↵	Select the Address (**AddR**) parameter.
◀ ▶	Set the Address value. The Modbus protocol requires an address field to correctly identify the selected device. The Omega protocol supports an optional address field which is required for Serial channels configured for RS485.
↵	Accept the entered value.

4.4.3 Serial Communications Parameters (INIt > CoMM > SER >C.PAR)

↵	Select **C.PAR**. Then, select individual parameters to configure the serial communications.

◀▶	Navigate to the correct setting. Settings include the following: • **bUS.F** – Specify RS232 or RS485 serial communications • **bAUd** – Baud rate (transmission rate) • **PRty** – Parity (used for transmission error checking) • **dAtA** – Number of bits per data point • **StoP** – Number of stop bits between data points
↵	Select the desired setting.

4.4.3.1 Serial Bus Format (INIt > CoMM > SER > C.PAR > bUS.F)

↵	Select the Bus Format (**bUS.F**) parameter.
◀▶	Navigate to the desired setting. Settings include the following: • **232C** – Allows one-to-one serial communications (factory default) • **485** – Allows multiple devices to operate on a single pair of wires
↵	Select the indicated option.

4.4.3.2 Baud Rate (INIt > CoMM > SER > C.PAR > bAUd)

↵	Select the Baud Rate (**bAUd**) parameter. The device being communicated to determines how fast you can set the Baud Rate.
◀▶	Navigate to the desired setting for Baud rate (bits per second): • **19.2** – 19,200 Baud (factory default) • **9600** – 9,600 Baud • **4800** – 4,800 Baud • **2400** – 2,400 Baud • **1200** – 1,200 Baud • **57.6** – 57,600 Baud • **115.2** – 115,200 Baud
↵	Select the indicated option.

4.4.3.3 Parity (INIt > CoMM > SER > C.PAR > PRty)

↵	Select the Parity (**PRty**) parameter.
◀▶	Navigate to the desired setting. Settings include the following: • **odd** – Odd parity used to verify communications (factory default) • **EVEN** – Even parity used to verify communications • **NoNE** – Parity is not used to verify communications
↵	Select the indicated option.

4.4.3.4 Data Bits (INIt > CoMM > SER > C.PAR > dAtA)

↵	Select the number of Data Bits (**dAtA)**.

◀▶	Navigate to the desired setting. Settings include the following: • **8bIt** – 8 bits used per data character (factory default) • **8bIt** – 7 bits used per data character
↵	Select the indicated option.

4.4.3.5 Stop Bits (INIt > CoMM > SER > C.PAR > StoP)

↵	Select the number of Stop Bits (**StoP**).
◀▶	Navigate to the desired setting. Settings include the following: • **1bIt** – 1 stop bit (factory default) • **2bIt** – 2 stop bits (provides a "force 1" parity bit)
↵	Select the indicated option.

4.5 Safety Features (INIt > SFty)

↵	Select Safety Features (**SFty**).
◀▶	Navigate to the desired parameter. Parameters include the following: • **PwoN** – Requires confirmation before running automatically at startup • **oPER** – User must select **RUN** when exiting from the **Stby**, **PAUS**, or **StoP** Modes • **SP.LM** – Setpoint limits can be set to limit the values that can be entered • **LPbk** – Loop break enable/disable and timeout value • **o.CRk** – Open circuit detection enable/disable
↵	Select the indicated option.

4.5.1 Power On Confirmation (INIt > SFty > PwoN)

↵	Select Power On Confirmation (**PwoN**).
◀▶	Navigate to the desired setting. Settings include the following: • **dSbL** – Program runs automatically at startup (factory default) • **ENbL** – The unit powers on and then displays **RUN**; press the ENTER button to run the program
↵	Select the desired setting.

4.5.2 Operating Mode Confirmation (INIt > SFty > oPER)

↵	Select the Operating Mode Confirmation **(oPER)** parameter.
◀▶	Navigate to the desired setting. Settings include the following: • **dSbL** – Pressing the ENTER button in **Stby**, **PAUS**, or **StoP** Modes will start running the current program immediately (factory default) • **ENbL** – Pressing the ENTER button in any Operating Menu Mode will display **RUN**; pressing the ENTER button again will start running the current program
↵	Select the desired setting.

4.5.3 Setpoint Limits (INIt > SFty > SP.LM)

↵	Select Setpoint Limits (**SP.LM)** to set limits on the values that can be used for the all Setpoints.

◀▶	Navigate to the desired setting. Settings include the following: • **SP.Lo** – Set the minimum possible Setpoint value • **SP.HI** – Set the maximum possible Setpoint value
↵	Select the desired setting.
◀▶	Set the Setpoint limit value.
↵	Confirm the value.

4.5.4 Loop Break Timeout (INIt > SFty > LPbk)

↵	Select the loop break (**LPbk**) parameter. When enabled, this parameter specifies the amount of time in Run Mode without a change in input value that would signify a sensor malfunction. For example, if there were a problem in a thermocouple, the input would not change over time.
◀▶	Navigate to the desired setting. Settings include the following: • **dSbL** – No loop break timeout protection (factory default) • **ENbL** – Set loop break timeout value
↵	Select the indicated setting.
◀▶	If **ENbL**, Set the loop break timeout value in minutes and seconds (MM.SS)
↵	Confirm the value.

4.5.5 Open Circuit (INIt > SFty > o.CRk)

↵	Select the open circuit (**o.CRk**) parameter. When **o.CRk** is enabled, the unit will monitor Thermocouples, RTD, and Thermistors for an open circuit condition.
◀▶	Navigate to the desired setting. Settings include the following: • **ENbL** – Open circuit conditions will stop the program and display **oPEN** (factory default) • **dSbL** – No open circuit protection (may be necessary when using high impedance infrared thermocouples or thermistors).
↵	Confirm the value.

4.6 Manual Temperature Calibration (INIt > t.CAL)

↵	Select the Manual Temperature Calibration (**t.CAL**) submenu. This parameter allows you to manually adjust the thermocouple, RTD, or Thermistor calibration curves provided with the unit. Once a curve has been manually adjusted, this setting can be set to NoNE to disable the manual adjustment (resetting to factory defaults will remove any manually adjustment factors).
◀▶	Navigate to the desired setting. Settings include: • **NoNE** – No manual calibration (factory default) • **1.PNt** – Manually create a 1-point calibration • **2.PNt** – Manually create a 2-point calibration • **ICE.P** – Manually create a 1-point calibration at 0°C
↵	Select the indicated option.

4.6.1 No Manual Temperature Calibration Adjustment (INIt > t.CAL > NoNE)

↵	Select **NoNE** to use the standard temperature sensor calibration curves. This mode will be used by most users.

4.6.2 Manual Temperature Calibration Offset Adjustment (INIt > t.CAL > 1.PNt)

↵	Select **1.PNt** to manually adjust the offset of the calibration curve base on the current reading.
◀▶	Set the Manual Thermocouple Calibration Offset value in degrees.
↵	Confirm the Offset value and pair it with the current input reading.

4.6.3 Manual Temperature Calibration Offset and Slope Adjustment (INIt > t.CAL > 2.PNt)

↵	Select **2.PNt** to use 2 points to manually adjust both the offset and slope of the calibration curve.
◀▶	Navigate to the desired setting. Settings include the following: • **R.Lo** – Set low point in degrees, default = 0, and associate with input reading • **R.HI** – Set high point in degrees, default = 999.9, and associate with input reading
↵	Select the indicated setting.
◀▶	Set the Temperature for **R.Lo** or **R.HI**.
↵	Confirm the value and pair it with the current input reading.

4.6.4 Temperature Ice Point Calibration (INIt > t.CAL > ICE.P)

↵	Select **ICE.P** to calibrate the zero point for the temperature sensor. This function basically operates the same as a **1.PNT** offset adjustment restricted to a measurement at the freezing point of water.
↵	The LED display shows **ok?** and requires confirmation. Confirm the Ice Point reset.

4.7 Save Current Configuration for All Parameters to a File (INIt > SAVE)

↵	Select Save Current Configuration Settings (**SAVE**) as the command to execute. If no thumb drive is present the failure code **E010** is displayed. Otherwise, a numeric designation for the save file is then specified and confirmed before the **SAVE** command executes. Important Note: The configuration file is a tab separated text file with a ".TXT" extension. It can be loaded onto a PC, read into Excel then modified there. Once modified, save it back as a tab separated .TXT file and it can then be loaded back into the unit using the **INIt > LoAd** command. This capability can be especially useful for editing complex multi ramp and soak programs. For more information on the configuration file format, see the "**Load and Save File Format Manual"**.
◀▶	Select a numeric file name from the range 0–99.

↵	Confirm the **SAVE** command. This saves the configuration to the file number specified. If the **SAVE** operation fails, the failure code **w004** is displayed. If the **SAVE** operation is successful, **doNE** is displayed.

4.8 Load a Configuration for All Parameters from a File (INIt > LoAd)

↵	Select the Load a Configuration (**LoAd**) command. If no thumb drive is present the failure code **E010** is displayed. Otherwise, a numeric designation for the file to be loaded is then specified and confirmed before the **LoAd** command executes.
◀▶	Select a numeric file name from the range 0–99.
↵	Confirm the **LoAd** command. This loads the configuration from the file number specified. If the **LoAd** operation fails, the failure code **w003** is displayed. If the **LoAd** operation is successful, **doNE** is displayed.

4.9 Display Firmware Revision Number (INIt > VER.N)

↵	Select the Display Firmware Revision Number (**VER.N**) function. The currently installed version number is displayed in the format 1.23.4 where "1" is the major revision number, "23" is the minor revision number, and "4" is the bug fix update number.

4.10 Update Firmware Revision (INIt > VER.U)

↵	Select the Update Firmware Revision (**VER.U**) function. Note that updating your firmware will reset the unit to factory defaults as well. If you want to keep you configuration settings, save them before installing new firmware.
↵	The LED display shows **ok?** and requires confirmation. Confirm the firmware update. New firmware will then be read from a thumb drive connected to the USB port.

4.11 Reset to Factory Default Parameters (INIt > F.dFt)

↵	Select the Reset to Factory Default Parameters (**F.dFt**) function. The LED display shows **ok?** and requires confirmation.
↵	Confirm the parameter reset.

4.12 Password-Protect Initialization Mode Access (INIt > I.Pwd)

↵	Select the Password Protect Initialization Mode Access (**I.Pwd**) function.
◀▶	Navigate to the desired setting. Settings include the following: • **No** – Do not require a password for **INIt** Mode (factory default) • **yES** – Require a password for **INIt** Mode; users will be prompted for this password when selecting **INIt**
↵	Select the indicated setting.
◀▶	If **yES**, set the numeric password from the range 0000–9999.
↵	Confirm the password.

4.13 Password-Protect Programming Mode Access (INIt > P.Pwd)

↵	Select the Password Protect Programming Mode Access (**P.Pwd**) function.

◀▶	Navigate to the desired setting. Settings include the following: • **No** – Do not require a password for **PRoG** Mode (factory default) • **yES** – Require a password for **PRoG** Mode; users will be prompted for this password when selecting **PRoG**
↵	Select the indicated setting.
◀▶	If **yES**, set the numeric password from the range 0000–9999.
↵	Confirm the password.

5. Reference Section: Programming Mode (PRoG)

Use Programming Mode to set the following parameters and perform the following functions:

5.1 Setpoint 1 Configuration (PRoG > SP1) 31
5.2 Setpoint 2 Configuration (PRoG > SP2) 31
5.3 Alarm Mode Configuration (PRoG > ALM.1, ALM.2) 31
5.4 Output Channel Configuration (PRoG > dtR1 or PRoG > dtR2) 35

5.1 Setpoint 1 Configuration (PRoG > SP1)

↵	Select the Setpoint 1 (**SP1**) parameter.
◀▶	Set the process goal value for **PId** or **oN.oF** control.
↵	Confirm the value.

5.2 Setpoint 2 Configuration (PRoG > SP2)

↵	Select the Setpoint 2 (**SP2**) parameter. **SP2** is used with Alarm functions and with on/off control when setting up for Heat/Cool Control Mode.
◀▶	Navigate to the desired setting. Settings include the following: • **ASbo** – The value for **SP2** is specified in Absolute Mode (factory default) • **dEVI** – The value specified for **SP2** indicates an offset (positive or negative) from **SP1**; this allows **SP2** to track any changes to **SP1** automatically
↵	Select the indicated setting.
◀▶	Set the correct value.
↵	Confirm the value.

5.3 Alarm Mode Configuration (PRoG > ALM.1, ALM.2)

↵	Select Alarm Configuration 1 (**ALM.1**) or Alarm Configuration 2 **(ALM.2)** in order to set up, change, enable, or disable Alarms. Either or both Alarms can be assigned to trigger display color changes, annunciators, and / or outputs. Either or both Alarm configurations can be assigned to multiple outputs. The **ALM.1** and **ALM.2** configuration menus have all of the same settings and function in the same manner.

◀▶	Navigate to the Alarm setting you want to change. Settings include the following: • **tyPE** – Alarm type absolute or deviation • **Ab.dV** – Alarm references values (**ALR.H** and **ALR.L**) or deviation from **SP1** or **SP2** • **ALR.H** – Alarm high parameter, used for Alarm trigger calculations • **ALR.L** – Alarm low parameter, used for Alarm trigger calculations • **A.CLR** – Alarm color indication • **HI.HI** – High High / Low Low offset value • **LtCH** – Alarm latching • **CtCL** – Alarm action (normally open or normally closed) • **A.P.oN** – Alarm power-on behavior • **dE.oN** – Time delay for Alarm trigger unless the condition persists, default = 1.0 s • **dE.oF** – Time delay for cancelling Alarms after being triggered; prevents Alarm "chatter," default = 0.0 s
↵	Select the indicated setting.

5.3.1 Alarm Type (PRoG > ALM.1, ALM.2 > tyPE)

↵	Select the Alarm Type (**tyPE**) parameter. This parameter will control the basic behavior of the selected alarm.
◀▶	Navigate to the desired setting. Settings include the following: • **oFF** – Alarm is off (factory default) • **AboV** – Alarm is triggered when the process value exceeds **ALR.H** (Absolute Mode) or the specified Setpoint plus **ALR.H** (Deviation Mode) • **bELo** – Alarm is triggered when the process value is less than **ALR.L** (Absolute Mode) or the specified Setpoint minus **ALR.L** (Deviation Mode) • **HI.Lo.** – Alarm is triggered when the process value is outside the **ALR.L–ALR.H** range (Absolute Mode) or the range defined by the band around the specified Setpoint as determined by **ALR.L** and **ALR.H** (Deviation Mode) • **bANd** – Alarm is triggered when the process value is within the **ALR.L–ALR.H** range (Absolute Mode) or within the band around the specified Setpoint as determined by **ALR.L** and **ALR.H** (Deviation Mode) ***Note:*** Table 5.1 compares the Alarm range options, and Figure 5.1 represents the Alarm range options graphically.
↵	Select the indicated setting.

Setting	Absolute (AbSo)	Deviation (d.SP1)	Deviation (d.SP2)
AboV	> ALR.H	> SP1 + ALR.H	> SP2 + ALR.H
bELo	< ALR.L	< SP1 - ALR.L	< SP2 - ALR.L
HI.Lo.	< ALR.L or > ALR.H	< SP1 - ALR.L or > SP1 + ALR.H	< SP2 - ALR.L or > SP2 + ALR.H
bANd	> ALR.L and < ALR.H	> SP1 - ALR.L and < SP1 + ALR.H	> SP2 - ALR.L and < SP2 + ALR.H

Table 5.1 – Alarm Range Option Comparison

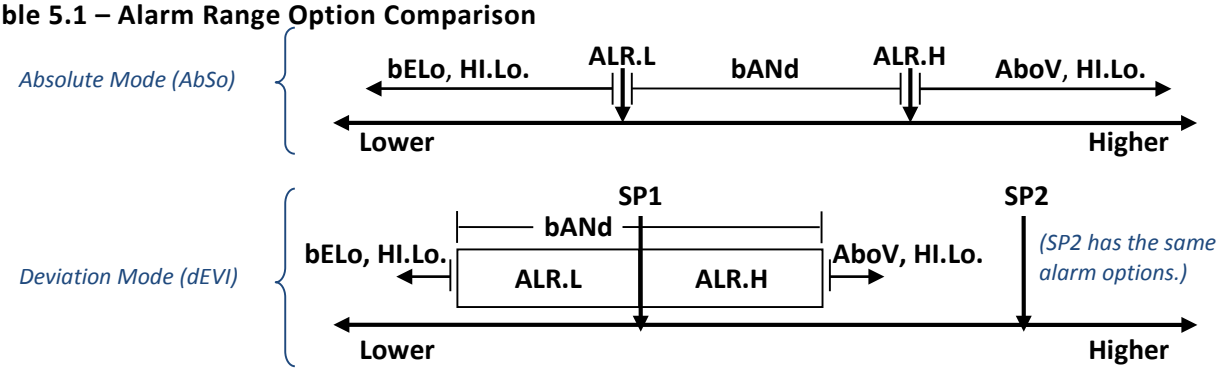

Figure 5.1 – Alarm Range Option Diagram

5.3.2 Absolute or Deviation Alarm (PRoG > ALM.1, ALM.2 > tyPE > Ab.dV)

↵	Select the Absolute or Deviation Alarm (**Ab.dV**) parameter.
◀ ▶	Navigate to the correct setting. Settings and subsettings include the following: • **AbSo** – Alarm is triggered using calculations based on the absolute values of **ALR.H** or **ALR.L** used as specified by the **tyPE** parameter • **d.SP1** – Alarm is triggered using calculations based on values relative to **SP1** as specified by the **tyPE** parameter • **d.SP2** – Alarm is triggered using calculations based on values relative to **SP2** as specified by the **tyPE** parameter
↵	Select the desired setting.

5.3.3 Alarm High Reference (PRoG > ALM.1, ALM.2 > tyPE > ALR.H)

↵	Select the Alarm High Reference (**ALR.H**) parameter.
◀ ▶	Set the Alarm High Reference value.
↵	Confirm the value.

5.3.4 Alarm Low Reference (PRoG > ALM.1, ALM.2 > tyPE > ALR.L)

↵	Select the Alarm Low Reference (**ALR.L**) parameter.
◀ ▶	Set the Alarm Low Reference value.
↵	Confirm the value.

5.3.5 Alarm Color (PRoG > ALM.1, ALM.2 > A.CLR)

↵	Select the Alarm Color (**A.CLR**) parameter.
◀ ▶	Navigate to the desired option. Options include the following: • **REd** – Alarm conditions are displayed in red (factory default) • **AMbR** – Alarm conditions are displayed in amber • **GRN** – Alarms conditions are displayed in green • **dEFt** – Alarms do not affect the default display color
↵	Select the desired option.

5.3.6 Alarm High High / Low Low Offset Value (PRoG > ALM.1, ALM.2 > HI.HI)

↵	Select the Alarm Offset Value (**HI.HI**) parameter. This parameter allows an offset to be added to the Alarm trigger point(s) which will flash the display when exceeded. Depending on the Alarm type the offset can apply above the trigger point, below it, or both. This is illustrated in Figure 5.2. **HI.HI** works with both absolute and deviation Alarms.
◀ ▶	Navigate to the correct option. Options include the following: • **oFF** – High High / Low Low function disabled (factory default) • **oN** – Display will flash in the color determined by the **A.CLR** parameter when the Process Value is greater than the HI.HI offset value away from the Alarm condition settings (in either direction)
↵	Select the indicated option.
◀ ▶	For **oN**, set the offset value.
↵	Confirm the value.

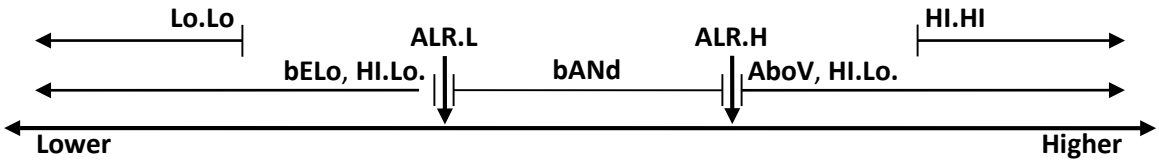

Figure 5.2 – Alarm HI.HI parameter

5.3.7 Alarm Latching (PRoG > ALM.1, ALM.2 > LtCH)

↵	Select the Alarm Latching (**LtCH**) parameter.
◀ ▶	Navigate to the desired option. Options include the following: • **No** – Alarm does not latch (factory default); the Alarm turns off when the Process Value returns to a non-Alarm condition • **yES** – Alarm latches; even if the Process Value returns to a non-Alarm condition, the Alarm condition remains active and must be unlatched using **oPER > L.RSt** • **botH** – Alarm latches and can be unlatched either by using **oPER > L.RSt** from the front panel or via the digital input • **RMt** – Alarm latches and can be unlatched only via the digital input
↵	Select the indicated option.

5.3.8 Alarm Normally Closed, Normally Open (PRoG > ALM.1, ALM.2 > CtCL)

↵	Select the Alarm Normally Open or Normally Closed (**CtCL**) parameter.
◀ ▶	Navigate to the desired option. Options include the following: • **N.o.** – Normally open: output is activated when the Alarm condition is met (factory default) • **N.C.** – Normally closed: output is activated in normal conditions, but turned off in the Alarm condition
↵	Select the indicated option.

5.3.9 Alarm Power-On Behavior (PRoG > ALM.1, ALM.2 > A.P.oN)

↵	Select the Alarm Power-On Behavior (**A.P.oN**) parameter.
◀ ▶	Navigate to the desired option. Option include: • **yES** – Alarms are active at power-on and do not require crossing the Setpoint (factory default) • **No** – Alarms are inactive at power-on; the process reading must cross the Alarm condition before being activated
↵	Select the indicated option.

5.3.10 Alarm On Delay (PRoG > ALM.1, ALM.2 > dE.oN)

↵	Select the Alarm On Delay (**dE.oN**) parameter.
◀ ▶	Set the number of seconds to delay triggering the Alarm. (The default is 0.) This setting can be used to prevent false Alarm triggering when the Process Value only briefly enters an Alarm condition.
↵	Confirm the value.

5.3.11 Alarm Off Delay (PRoG > ALM.1, ALM.2 > dE.oF)

↵	Select the Alarm Off Delay (**dE.oF**) parameter.
◀ ▶	Set the number of seconds to delay cancelling the Alarm. (The default is 0.) This setting can be used to prevent Alarm chatter.
↵	Confirm the value.

5.4 Output Channel Configuration (PRoG > dtR1 or PRoG > dtR2)

◀ ▶	The Output Configuration submenus are only available if panel meter unit is a "-330" version with two Double Throw Mechanical Relays installed. Navigate to the desired output channel in order to configure that output. • **dtR1** – Double Throw Mechanical Relay number 1 • **dtR2** – Double Throw Mechanical Relay number 2 ***Note:*** Both relays have the same menu structure.
↵	Select the indicated relay and then select **ModE** in order to change the configuration of that relay.

5.4.1 Output Channel Mode (PRoG > dtR1, dtR2 > ModE)

↵	Select Output Channel Mode (**ModE**) to configure the specified output.
◀ ▶	Navigate to the desired setting. Settings include the following: • **oFF** – Turn off the output channel (factory default) • **ALM.1** – Set the output to be an Alarm, activating when alarm conditions according to the **ALM.1** configuration parameters are active. • **ALM.2** – Set the output to be an Alarm, activating when alarm conditions according to the **ALM.2** configuration parameters are active.
↵	Select the indicated setting.

6. Reference Section: Operating Mode (oPER)

Operating Mode is used to activate the unit's monitoring and controlling functions. It also allows shortcut access to the Setpoint parameters while still running. Use Operating Mode to set the following parameters and perform the following functions:

6.1 Normal Run Mode (oPER > RUN) 36
6.2 Change Setpoint 1 (oPER > SP1) 37
6.3 Change Setpoint 2 (oPER > SP2) 37
6.4 Clear Latched Alarms (oPER > L.RSt) 37
6.5 Display Valley Reading (oPER > VALy) 37
6.6 Display Peak Reading (oPER > PEAk) 37
6.7 Standby Mode (oPER > Stby) 38

6.1 Normal Run Mode (oPER > RUN)

↵	Select Normal Run Mode (**RUN**). The ENTER button starts the unit operating according to the current input, output, and communications settings. Run Mode will automatically be entered and activated at unit power-on if the Power on Confirmation (4.5.1 Power On Confirmation (INIt > SFty > PwoN)) parameter is set to **dSbL**. The process value is displayed in the main display, and if the unit uses dual displays, the current Setpoint value is displayed in the secondary display. With the unit remaining active, the **oPER** menu selections can be navigated to using the LEFT and RIGHT buttons.

6.2 Change Setpoint 1 (oPER > SP1)

↵	Select the Change Setpoint 1 (**SP1**) parameter. This function allows Setpoint 1 to be changed while remaining in Run Mode. Pressing the ENTER button after changing a Setpoint while in **RUN** Mode returns you to **RUN** Mode with no interruption in monitoring, control, or communications operations. If remote Setpoint is enabled, Setpoint 1 cannot be changed here and the display will flash.
◀ ▶	Set the desired value for Setpoint 1. When changing the setpoints from the operating mode menu, the left arrow decreases the value with acceleration and the right arrow increases the value with acceleration. This is different from the decimal place switching numeric change control in other places as changes made here are usually limited.
↵	Confirm the value.

6.3 Change Setpoint 2 (oPER > SP2)

↵	Select the Change Setpoint 2 (**SP2**) parameter. This function allows Setpoint 2 to be changed while remaining in **RUN** Mode. The current value for Setpoint 2 flashes in the main display. Setpoint 2 is only used for Alarms and as the cooling Setpoint in Heat/Cool Control Mode. See 6.2 Change Setpoint 1 (oPER > SP1) for additional information.
◀ ▶	Set the desired value for Setpoint 2.
↵	Confirm the value.

6.4 Clear Latched Alarms (oPER > L.RSt)

↵	Select the Clear Latched Alarms command (**L.RSt**) to clear currently latched Alarms. Alternatively, use digital input to activate the **L.RSt** command if configured in the PRoG menu as explained in 5.3.4 Alarm Latching (PRoG > ALM.1, ALM.2 > LtCH).
↵	Return to **RUN** Mode or to displaying "**RUN**" depending on the Operating Safety parameter setting (4.5.2 Operating Mode Confirmation (INIt > SFty > oPER)).

6.5 Display Valley Reading (oPER > VALy)

↵	Select Display Valley Reading (**VALy**) to change the process value displayed to the lowest reading since **VALy** was last cleared.
↵	Clear the **VALy** reading buffer. Return to **RUN** Mode or to displaying "**RUN**" depending on the Operating Safety parameter setting (4.5.2 Operating Mode Confirmation (INIt > SFty > oPER)). ***Note:*** Using the other buttons to navigate away from **VALy** does not clear the **VALy** reading buffer.

6.6 Display Peak Reading (oPER > PEAk)

↵	Select Display Peak Reading (**PEAk**) to change the process value displayed to the highest reading since **PEAk** was last cleared.
↵	Clear the **PEAk** reading buffer. Return to **RUN** Mode or to displaying "**RUN**" depending on the Operating Safety parameter setting (4.5.2 Operating Mode Confirmation (INIt > SFty > oPER)). ***Note:*** Using the other buttons to navigate away from **PEAk** does not clear the **PEAk** reading buffer.

6.7 Standby Mode (oPER > Stby)

↵	Select Standby Mode (**Stby**) to disable outputs and Alarm conditions. **Stby** is displayed until navigating elsewhere. Navigate to any desired initialization or programming settings to change them or to adjust the process.
↵	Return to **RUN** Mode or to displaying "**RUN**" depending on the Operating Safety parameter setting (4.5.2 Operating Mode Confirmation (INIt > SFty > oPER)).

7. Specifications

7.1 Inputs

Input Types	Thermocouple, RTD, Thermistor, Analog Voltage, Analog Current
Current Input	4 to 20 mA, 0 to 24 mA Scalable
Voltage Input	-100 to 100 mV, -1 to 1 V, -10 to 10 Vdc Scalable
Thermocouple Input (ITS 90)	K, J, T, E, R, S, B, C, N
RTD Input (ITS 90)	100/500/1000 Ω Pt sensor, 2-, 3- or 4-wire; 0.00385 (100 Ω only), 0.00392 (100 Ω only), or 0.003916 (100 Ω only) curves
Configuration	Differential
Polarity	Bipolar
Accuracy	Refer to Table 7.1
Resolution	0.1°F/°C temperature; 10 µV process
Input Impedances	Process Voltage: 10 MΩ for +/- 100 mV Process Voltage: 1 MΩ for other voltage ranges Process Current: 5 Ω Thermocouple: 10 KΩ max
Temperature Stability	• RTD: 0.04°C/°C • TC at 25°C (77°F): 0.05°C/°C (cold junction compensation) • Process: 50 ppm/°C
A/D Conversion	24 bit Sigma Delta
Reading Rate	20 samples per second
Digital Filter	Programmable from 0.05 seconds (filter = 1) to 6.4 seconds (filter = 128)
CMRR	120 dB
Excitation	Firmware selectable (no jumpers to set) to 5, 10, 12, and 24 Vdc @ 25 mA
Setpoint Adjustment	-9999 to +9999 counts
Warm Up to Rated Accuracy	30 min

7.2 Outputs (Optional with "-AL" Configurations)

SPDT Relay	Single pole, double throw mechanical relay, 250 Vac or 30 Vdc at 3 A (Resistive Load)

7.3 Communications (USB Standard, Optional Serial and Ethernet)

Connection	USB: Female Micro-USB, Ethernet: Standard RJ45, Serial: Screw terminals
USB	USB 2.0 Host or Device
Ethernet	Standards Compliance IEEE 802.3 10/100 Base-T Auto-switching, TCP/IP, ARP, HTTPGET
Serial	Software Selectable RS/232 or RS/485. Programmable 1200 to 115.2 K baud.
Protocols	Omega ASCII, Modbus ASCII / RTU

7.4 Isolation

Approvals	UL, C-UL, and CE (8. Approvals Information)

Power to Input/Output	• 2300 Vac per 1 min test • 1500 Vac per 1 min test (Low-Voltage/Power Option)
Power to Relays/SSR Outputs	2300 Vac per 1 min test
Relays/SSR to Relay/SSR Outputs	2300 Vac per 1 min test
RS-232/485 to Inputs/Outputs	500 Vac per 1 min test

7.5 General

Display	4-digit, 9-segment LED; red, green, and amber programmable colors for process variable, Setpoint, and temperature units • 10.2 mm (0.40"): 32Pt, 16Pt • 21 mm (0.83"): 8Pt
Dimensions	• 8Pt Series: 48 H x 96 W x 127 mm D, (1.89 x 3.78 x 5") • 16Pt Series: 48 H x 48 W x 127 mm D, (1.89 x 1.89 x 5") • 32Pt Series: 25.4 H x 48 W x 127 mm D, (1.0 x 1.89 x 5")
Panel Cutout	• 8Pt Series: 45 H x 92 mm W (1.772" x 3.622"), 1/8 DIN • 16Pt Series: 45 mm (1.772") square, 1/16 DIN • 32Pt Series: 22.5 H x 45 mm W (0.886" x 1.772"), 1/32 DIN
Environmental Conditions	All Models: 0–50°C (32–122°F), 90% RH non-condensing
External Fuse Required	Time-Delay, UL 248-14 listed: • 100 mA/250 V • 400 mA/250 V (Low-Voltage Option) Time-Lag, IEC 127-3 recognized: • 100 mA/250 V • 400 mA/250 V (Low-Voltage Option)
Line Voltage/Power	• 90–240 Vac +/-10%, 50-400 Hz[1] • 110–375 Vdc, equivalent voltage • 4 W: power for 8Pt, 16Pt, 32Pt Models • 5 W: power for 8DPt, 16DPt Models
Low-Voltage/Power Option	External power source must meet Safety Agency Approvals. Units can be powered safely with 24 Vac power, but no certification for CE/UL is claimed. • 12–36 Vdc: 3 W power for 8Pt, 16Pt, 32Pt
Protection	• NEMA-4x/Type 4x/IP65 front bezel: 32Pt, 16Pt • NEMA-1/Type 1 front bezel: 8Pt
Weight	• 8Pt Series: 295 g (0.65 lb) • 16Pt Series: 159 g (0.35 lb) • 32Pt Series: 127 g (0.28 lb)

[1] No CE compliance above 60 Hz

Input Type	Description	Range	Accuracy
Process	Process Voltage	+/-100 mV, +/-1, +/-10 Vdc	0.03% Rdg
Process	Process Current	Scalable within 0 to 24 mA	0.03% Rdg
J Type T/C	Iron-Constantan	-210 to 1200°C / -346 to 2192°F	0.4°C / 0.7°F
K Type T/C	CHROMEGA®-ALOMEGA®	-270 to -160°C / -454 to -256°F	1.0°C / 1.8°F
		-160 to -1372°C / -256 to 2502°F	0.4°C / 0.7°F
T Type T/C	Copper-Constantan	-270 to -190°C / -454 to -310°F	1.0°C / 1.8°F
		-190 to 400°C / -310 to 752°F	0.4°C / 0.7°F
E Type T/C	CHROMEGA®-Constantan	-270 to -220°C / -454 to -364°F	1.0°C / 1.8°F
		-220 to 1000°C / -364 to 1832°F	0.4°C / 0.7°F
R Type T/C	Pt/13%Rh-Pt	-50 to 40°C / -58 to 104°F	1.0°C / 1.8°F
		40 to 1788°C / 104 to 3250°F	0.5°C / 0.9°F
S Type T/C	Pt/10%Rh-Pt	-50 to 100°C / -58 to 212°F	1.0°C / 1.8°F
		100 to1768°C / 212 to 3214°F	0.5°C / 0.9°F
B Type T/C	30%Rh-Pt/6%Rh-Pt	100 to 640°C / 212 to 1184°F	1.0°C / 1.8°F
		640 to 1820°C / 1184 to 3308°F	0.5°C / 0.9°F
C Type T/C	5%Re-W/26%Re-W	0 to 2320°C / 32 to 4208°F	0.4°C / 0.7°F
N Type T/C	Nicrosil-Nisil	-250 to -100°C / -418 to -148°F	1.0°C / 1.8°F
		-100 to 1300°C / -148 to 2372°F	0.4°C / 0.7°F
RTD	Pt, 0.00385, 100 Ω, 500 Ω, 1000 Ω	-200 to 850°C / -328 to 1562°F	0.3°C / 0.5°F
RTD	Pt, 0.003916, 100 Ω	-200 to 660°C / -328 to 1220°F	0.3°C / 0.5°F
RTD	Pt, 0.00392, 100 Ω	-200 to 660°C / -328 to 1220°F	0.3°C / 0.5°F
Thermistor	2252 Ω	-40 to 120C / -40 to 248F	0.2°C / 0.35°F
Thermistor	5K Ω	-30 to 140C / -22 to 284F	0.2°C / 0.35°F
Thermistor	10K Ω	-20 to 150C / -4 to 302F	0.2°C / 0.35°F

Table 7.1 – Ranges and Accuracies for Supported Inputs

Code	Error Code Descriptions
E001	File not found during load operation
E002	Bad file format during load operation
E003	File read error during load operation
E004	File write error during save operation
E005	Device not found for read or write operation
E006	Loop break timeout
E009	Input signal out of range
E010	Communications device not ready (USB, Serial, etc)
E011	Communications install error
E012	Failed attempt to open a communications device
E013	Failed attempt to read from a communications device
E014	Failed attempt to write to a communications device
E015	Bad reboot, attempt to reboot from an unknown source

Table 7.2 – Error Code Descriptions

8. Approvals Information

CE This product conforms to the EMC directive 89/336/EEC amended by 93/68/EEC and with the European Low-Voltage Directive 72/23/EEC.

Electrical Safety EN61010-1:2010
Safety requirements for electrical equipment for measurement, control, and laboratory

Double Insulation; Pollution Degree 2

Dielectric withstand Test per 1 min

- Power to Input/Output: 2300 Vac (3250 Vdc)
- Power to Input/Output[2]: 1500 Vac (2120 Vdc)
- Power to Relays/SSR Output: 2300 Vac (3250 Vdc)
- Ethernet to Inputs: 1500 Vac (2120 Vdc)
- Isolated RS232 to Inputs: 500 Vac (720 Vdc)
- Isolated Analog to Inputs: 500 Vac (720 Vdc)
- Analog/Pulse to Inputs: No Isolation

Measurement Category I
Category I includes measurements performed on circuits not directly connected to the Mains Supply (power). Maximum Line-to-Neutral working voltage is 50Vac/dc. This unit should not be used in Measurement Categories II, III, and IV.

Transients Overvoltage Surge (1.2 / 50uS pulse)

- Input Power: 2500 V
- Input Power[3]: 1500 V
- Ethernet: 1500 V
- Input/Output Signals: 500 V

EMC EN61326:1997 + and A1:1998 + A2:2001

Immunity and Emissions requirements for electrical equipment for measurement, control, and laboratory are as follows:

- EMC Emissions Table 4, Class A of EN61326
- EMC Immunity[4] Table 1 of EN61326

UL File Number: E209855

[2] Low-voltage DC power option: Units configured for external low power DC voltage, 12–36Vdc.
[3] Ibid.
[4] I/O signal and control lines require shielded cables, and these cables must be located on conductive cable trays or in conduits. The length of these cables should not exceed 30 meters.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **61 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **five (5) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

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